How to Develop a Research Methodology

A student-friendly lecture on designing, justifying, and writing a clear methodology chapter for academic research.

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ORIENTATION

Lecture Overview

Foundations

Key meanings, purpose, and the role of methodology in research.

Core decisions

Approach, design, sampling, data collection, instruments, analysis, rigor, and ethics.

Writing process

How to build a methodology section step by step.

Application

Examples, scenario, activity, and knowledge check.

By the end, students should be able to plan a methodology that is aligned with the research problem and defend each methodological choice.

OUTCOMES

Learning Objectives

1. Define research methodology and distinguish it from method and design.
2. Choose a suitable approach and design for a research question.
3. Develop a coherent sampling, data collection, and data analysis plan.
4. Explain validity, reliability, trustworthiness, and triangulation in simple terms.
5. Identify ethical issues such as informed consent, confidentiality, and bias.
6. Write and justify a methodology section for a thesis, dissertation, or article.

FOUNDATION

Introduction: Why Methodology Matters

Purpose

Turns a research question into a workable plan.

Shows how evidence will be collected and analyzed.

Explains why the chosen strategy is appropriate.

Credibility

Allows readers to judge quality and transparency.

Connects design decisions with validity or trustworthiness.

Makes findings easier to evaluate and replicate where appropriate.

Academic Use

Central chapter in theses and dissertations.

Required in journal articles and research proposals.

Helps supervisors, reviewers, and examiners assess fit.

CONCEPTS

Key Definitions

Term	Student-friendly meaning	Example
Research methodology	The overall logic and justification for how the study will be conducted.	A mixed-methods methodology to study online learning experiences.
Research method	A specific technique used to collect or analyze data.	Survey, interview, experiment, observation.
Research design	The structured plan that organizes the study.	Cross-sectional survey, case study, randomized trial.
Population	The larger group the study wants to understand.	Undergraduate students in public universities.
Sample	The selected participants or units studied.	300 students selected by stratified sampling.

FOUNDATION

Background and Context

Academic context

Research methodology grew from the need to make inquiry systematic, transparent, and open to critique.

Different disciplines use different traditions: experiments, surveys, ethnography, archival analysis, design science, and more.

A strong methodology shows how philosophical assumptions, research questions, and practical constraints are connected.

What readers expect

A clear rationale for the approach and design.

Enough detail to understand how evidence was produced.

Procedures that respect ethics, quality, and feasibility.

Acknowledgment of limitations and researcher decisions.

CORE IDEA

Main Concept: Methodology as Alignment

Research problem

What needs to be understood or solved?

Research question

What exactly will the study answer?

Methodology

What strategy can produce credible evidence?

Findings

What interpretation can be defended?

Rule of thumb: every methodological decision should be traceable back to the research question and should support a defensible interpretation.

Example alignment

If the question asks “how teachers experience AI tools,” interviews or focus groups may fit better than a purely numerical survey. If the question asks “how much AI use predicts grades,” a quantitative design may fit better.

MAIN CONCEPTS

Core Components of a Methodology Section

Approach

Qualitative, quantitative, or mixed methods.

Design

Structure of the study.

Participants

Population, sample, and sampling logic.

Data collection

What data will be collected and how.

Instruments

Tools, measures, protocols, or materials.

Analysis

How data will be processed and interpreted.

Quality

Validity, reliability, trustworthiness.

Ethics

Consent, privacy, fairness, and integrity.

A methodology is strong when these components form one coherent plan rather than separate unrelated paragraphs.

CLASSIFICATIONS

Types of Research Approaches

Qualitative

Explores meanings, experiences, processes, or contexts.

Uses words, images, observations, or documents as data.

Common analyses: thematic, narrative, grounded theory, content analysis.

Quantitative

Measures variables and tests relationships, differences, or effects.

Uses numerical data and statistical analysis.

Common analyses: descriptive statistics, regression, t-test, ANOVA.

Mixed Methods

Combines qualitative and quantitative evidence.

Useful when one type of data is not enough.

Common designs: explanatory sequential, exploratory sequential, convergent.

CLASSIFICATIONS

Common Research Designs

Survey design

Collects standardized responses from many people.

Experimental design

Tests the effect of an intervention or treatment.

Case study

Investigates one case or a small number of cases deeply.

Phenomenology

Studies lived experiences of a phenomenon.

Ethnography

Studies culture, practices, and meanings in context.

Action research

Solves a practical problem while studying change.

Design science

Builds and evaluates an artifact or system.

Longitudinal design

Collects data across time to examine change.

CLASSIFICATIONS

Paradigms and Methodology Choices

Paradigm	Typical assumption	Methodology implication
Positivism	Reality can be measured objectively.	Often supports quantitative, experimental, or survey designs.
Interpretivism	Reality is socially constructed and context-sensitive.	Often supports qualitative interviews, observations, and case studies.
Pragmatism	Research choices should help answer the practical question.	Often supports mixed methods and flexible designs.

Important reminder

Paradigms guide methodological choices, but researchers should always justify choices by their research question, literature, discipline, and available evidence.

PROCESS

Step-by-Step Process Overview

1. Define problem and questions
2. Review literature and gap
3. Select approach and design
4. Plan population and sampling
5. Choose data collection methods
6. Prepare instruments and protocols
7. Plan data analysis
8. Build quality and ethics
9. Write, justify, and revise

The steps are iterative: researchers often return to earlier decisions as literature, feasibility, or ethics become clearer.

PROCESS

Step 1: Clarify the Research Problem and Questions

Ask before choosing methods

What problem does the study address?

What gap in knowledge or practice exists?

Is the question exploratory, descriptive, explanatory, evaluative, or design-oriented?

What type of evidence would answer the question convincingly?

Methodology implication

“What are the experiences of…” often points to qualitative inquiry.

“What is the relationship between…” often points to quantitative analysis.

“How and why does this happen?” may fit case study or mixed methods.

“Does an intervention work?” may fit experimental or quasi-experimental design.

PROCESS

Step 2: Select the Approach and Research Design

Decision questions

Will the study measure variables, explore meanings, or both?

Is the aim to describe, explain, compare, evaluate, or develop something?

Will data be collected once or across time?

Will the researcher intervene, observe, or analyze existing data?

What resources, access, time, and skills are available?

Writing formula

Name the approach: qualitative, quantitative, or mixed methods.

Name the design: survey, case study, experiment, etc.

Explain fit with the research question.

Cite methodological literature where appropriate.

Acknowledge alternative designs and why they were not selected.

PROCESS

Step 3: Plan Population, Participants, and Sampling

Population

Define the group, setting, organization, documents, cases, or events the study concerns.

Sampling frame

Explain how the researcher can access possible participants or units.

Sampling technique

Select probability, non-probability, purposive, stratified, random, convenience, etc.

Sample size

Justify using statistical needs, saturation, practical feasibility, or design standards.

Inclusion/exclusion

State who is eligible and who is not, with reasons.

Recruitment

Describe how participants will be contacted and invited ethically.

PROCESS

Step 4: Choose Data Collection Methods

Method	Useful for	Typical output
Survey/questionnaire	Attitudes, frequencies, self-reports, variables	Numerical or categorical responses
Interview/focus group	Experiences, meanings, reasoning, perceptions	Audio/text transcripts
Observation	Behaviors, interactions, settings, processes	Field notes, observation records
Document/data analysis	Policies, records, posts, reports, datasets	Textual or numerical data
Experiment/intervention	Cause-effect testing under controlled conditions	Pre/post measures, group comparisons

PROCESS

Step 5: Prepare Instruments and Operational Definitions

Instruments may include

Questionnaires and rating scales.

Interview or focus group guides.

Observation checklists.

Experimental materials or tasks.

Coding manuals or document extraction forms.

Software logs, datasets, or system metrics.

Operational definitions should state

What the concept means in this specific study.

How it will be observed, measured, or coded.

What scale, source, or criteria will be used.

How consistency will be maintained across participants, coders, or time.

Whether existing instruments need permission or adaptation.

PROCESS

Step 6: Plan Data Analysis and Interpretation

Quantitative analysis

Data cleaning and coding.

Descriptive statistics.

Assumption checking.

Tests such as t-test, ANOVA, regression, or correlation.

Effect sizes and confidence intervals where relevant.

Qualitative analysis

Transcription or data preparation.

Familiarization with data.

Coding and theme development.

Use of memos and quotations.

Reflexive interpretation of meanings and context.

Mixed-methods analysis

Analyze each data type clearly.

Explain sequence or priority.

Integrate results using joint displays, comparison, or explanation.

State how contradictions will be handled.

PROCESS

Step 7: Build Quality, Rigor, and Trustworthiness

Approach	Quality focus	Possible strategies
Quantitative	Validity, reliability, measurement accuracy, statistical conclusion quality.	Pilot testing, reliable scales, clear procedures, adequate sample size, assumption checks.
Qualitative	Credibility, dependability, confirmability, transferability.	Member checking, audit trail, triangulation, thick description, reflexive notes.
Mixed methods	Quality of each strand and quality of integration.	Transparent sequencing, integration matrix, explanation of inconsistent findings.

A strong methodology does not simply claim quality; it explains the procedures used to support quality.

APPLICATION

Practical Examples Across Disciplines

Discipline	Possible study	Suitable methodology
Social sciences	Community perceptions of public safety.	Qualitative interviews with thematic analysis.
Business and management	Factors predicting customer loyalty.	Quantitative survey with regression analysis.
Education	Impact of feedback style on student engagement.	Quasi-experimental or mixed-methods design.
Health sciences	Patient experiences of telemedicine follow-up.	Qualitative phenomenological interviews.
Psychology	Relationship between stress and sleep quality.	Cross-sectional correlational survey.
Information technology	Usability of a new learning app.	Design science evaluation with usability testing.

APPLICATION

Research Example: Developing a Methodology

Research scenario

Topic: AI writing tools and student academic writing.

Problem: Universities need to understand how students use AI tools and how this affects writing confidence.

Research question: How do master’s students perceive the influence of AI writing tools on their academic writing process?

Methodology choices

Approach: Qualitative.

Design: Phenomenological or basic qualitative study.

Participants: 15–20 master’s students who have used AI writing tools.

Sampling: Purposive sampling based on usage experience.

Data collection: Semi-structured interviews.

Analysis and interpretation

Data analysis: Thematic analysis of interview transcripts.

Quality: Interview guide pilot, reflexive notes, peer review of codes, rich description.

Ethics: Consent, confidentiality, voluntary participation.

Expected interpretation: Themes may show benefits, concerns, and academic-integrity tensions.

COMPARISON

Comparison Table: Qualitative, Quantitative, and Mixed Methods

Feature	Qualitative	Quantitative	Mixed methods
Purpose	Understand meanings and experiences.	Measure variables and test patterns.	Combine explanation and measurement.
Data	Words, images, observations, documents.	Numbers, scores, counts, categories.	Both qualitative and quantitative data.
Sample	Usually smaller and purposeful.	Often larger and structured.	Depends on design and sequence.
Analysis	Coding, themes, interpretation.	Statistical tests and models.	Separate analyses plus integration.
Best fit	How/why experiences and processes.	How much, how many, relationship, effect.	Complex questions needing both evidence types.

EVALUATION

Advantages of a Well-Developed Methodology

Clarity

Readers understand exactly how the study was carried out.

Credibility

Findings appear more trustworthy because procedures are transparent.

Alignment

Research questions, design, data, and analysis work together.

Replicability or transferability

Others can repeat the process or judge relevance to another context.

Ethical strength

Risks, privacy, and participant rights are considered early.

Efficient execution

The researcher has a practical plan before collecting data.

EVALUATION

Limitations and Challenges

Access to participants, datasets, organizations, or field sites may be restricted.

Time and budget can limit sample size, longitudinal data, or intensive fieldwork.

Some methods require advanced statistical, qualitative, or software skills.

Self-report data may be affected by recall errors or social desirability bias.

A single design may not capture all dimensions of a complex problem.

Institutional ethics review can require revisions before data collection begins.

Best response to limitations

Do not hide limitations. Explain them honestly and show how the methodology reduces their effect where possible.

EVALUATION

Common Mistakes in Developing Methodology

Choosing methods before defining the research question.

Start with the problem and evidence needed.

Confusing methodology with methods.

Explain both the plan and the specific techniques.

Writing generic textbook descriptions.

Write about your actual study, not only definitions.

Ignoring sampling justification.

Explain who, why, how many, and how recruited.

Forgetting the analysis plan.

State exactly how each data type will be analyzed.

Treating ethics as a formality.

Address consent, privacy, risk, and data security.

RECOMMENDATIONS

Best Practices for Writing the Methodology

Use subheadings that match common methodology components.

Begin each section with the decision, then explain the reason.

Use methodological literature to support major choices.

Link every method to one or more research questions.

Describe procedures in enough detail for evaluation.

Explain instruments, sampling, analysis, quality strategies, and ethics clearly.

Use past tense for completed studies and future tense for proposals.

Be transparent about limitations and delimitations.

ETHICS

Ethical Considerations

Informed consent

Participants should understand the study purpose, procedures, risks, benefits, and their right to withdraw.

Confidentiality and privacy

Protect identities and sensitive information through anonymization, secure storage, and limited access.

Avoiding harm

Minimize psychological, social, professional, legal, or physical risks.

Bias and fairness

Avoid unfair participant selection, leading questions, selective reporting, and discriminatory assumptions.

Academic integrity

Report methods honestly, cite sources, do not fabricate data, and disclose conflicts of interest.

Data management

Plan data storage, retention, deletion, and sharing according to institutional rules.

CLASSROOM EXERCISE

Activity: Build a Methodology Mini-Plan

Activity objective

Students will practice translating a research question into a basic methodology plan and justifying each choice.

Instructions

Choose one research question from your field.

Select an approach and design.

Identify population, sampling technique, and sample size logic.

Choose data collection and analysis methods.

Write a 5-sentence justification.

Expected outcome

Each group produces a short methodology mini-plan that shows alignment between the question, evidence, design, sampling, and analysis.

ENGAGEMENT

Discussion Questions

Why is methodology more than a list of methods?

How can a researcher know whether a qualitative, quantitative, or mixed approach fits best?

What makes a sampling strategy convincing?

How should researchers justify using a small qualitative sample?

What is the difference between validity and trustworthiness?

Which ethical issues are most common in student research projects?

How can limitations be written honestly without weakening the study?

What would make a methodology chapter easy for an examiner to evaluate?

ASSESSMENT

Knowledge Check

1. What is the main purpose of a research methodology section?
2. Which term refers to a specific technique such as an interview or survey?
3. A study measuring the relationship between stress and sleep quality is most likely which approach?
4. Name two items that should be included in a sampling plan.
5. What is one quality strategy for qualitative research?
6. Why should the data analysis plan be described before data collection?
7. What ethical principle requires participants to understand and agree to participation?
8. Short answer: Give one example of alignment between research question and method.

Answer Key

1. To explain and justify how the study will answer the research question credibly and ethically.

2. Research method.

3. Quantitative approach, often correlational design.

4. Population, sampling frame, technique, sample size, eligibility criteria, recruitment plan.

5. Examples: member checking, audit trail, triangulation, reflexive notes, thick description.

6. It ensures data collected will match the intended analysis and research questions.

7. Informed consent.

8. Example: “How teachers experience remote learning” aligned with semi-structured interviews and thematic analysis.

SUMMARY

Key Takeaways

Methodology is logic

It explains the reasoning behind design, methods, sampling, analysis, quality, and ethics.

Alignment is essential

The research problem and research questions should guide every decision.

Justification matters

Do not only describe what you will do; explain why it is appropriate.

Quality and ethics are built in

Good methodology prevents weak evidence, unclear procedures, and ethical risk.

CLOSING

Conclusion

Developing a research methodology means designing a coherent, ethical, and defensible pathway from research question to evidence and interpretation.

Final message

A strong methodology does not guarantee perfect research, but it helps ensure that the study is systematic, transparent, aligned, and credible. For students and researchers, it is one of the most important parts of a thesis, dissertation, proposal, or journal article.

Methodology is where research becomes a clear plan.

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